Electronic Supplementary Information Material

Mechanistic Investigation of Energy Transfer in Perylene-cored Anthracene Dendrimers

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### Table S1 SEC results for 1-10

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<th>Entry</th>
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$^a$ See ref. 6. $^b$ Calibrated with narrow-dispersity polystyrene standards. $^c$ Retention volume.

### Fig. S1
Semilogarithmic plot of average molecular weights ($M_w$) vs. retention volumes ($V$) for dendrimers (●) and polystyrenes (▲).
**Preparation and characterization of 12.** Although preparation of this compound (CAS 2417-72-3) has already been reported, a modification procedure was attempted to increase the product yield as follows. A solution of 11 (1.00 g, 6.66 mmol), N-bromosuccinimide (1.54 g, 8.65 mmol), and AIBN (0.10 g, ca. 10%) in chloroform (60 mL) was heated to reflux with vigorous stirring under argon. After 6 hours, the reaction mixture was cooled to room temperature and the solvent was then evaporated under vacuum. The residue was dissolved in ethyl acetate (50 mL) and the resulting solution was washed with water (20 mL) and brine (20 mL), dried over Na₂SO₄, and concentrated in vacuo. Purification of the residue by flush column chromatography on silica gel (eluent: chloroform) and recrystallization from CHCl₃-hexane gave 12 (1.33 g, 87%) as colorless crystals: mp 50-51 °C; IR (KBr) 1610 cm⁻¹ (C=C), 1722 cm⁻¹ (C=O); ¹H-NMR (CDCl₃) δ 3.92 (s, 3H, OCH₃), 4.50 (s, 2H, CH₂Br), 7.46 (d, J = 8.4 Hz, 2H, ArH), 8.02 (d, J = 8.4 Hz, 2H, ArH); ¹³C-NMR (CDCl₃) δ 32.1 (CH₂), 52.1 (CH₃), 129.0 (CH), 130.1 (CH), 142.6 (C), 166.5 (C).

**Preparation and characterization of 13L.** A solution containing 12 (0.85 g, 3.71 mmol), 3-(benzoyloxy)phenol (0.72 g, 3.36 mmol), potassium carbonate (0.70 g, 5.06 mmol), and 18-crown-6 (0.5 g, 1.89 mmol) in acetone (5 mL) was refluxed with vigorous stirring under argon. After 4 hours, the reaction mixture was cooled to room temperature, poured into saturated ammonium chloride solution (5 mL), and extracted twice with ethyl acetate (20 mL). The extracts were washed with water (20 mL) and brine (20 mL), dried over Na₂SO₄, and concentrated in vacuo. Purification of the residue by flush column chromatography on silica gel (eluent: chloroform/hexane = 70/30) and recrystallization from CHCl₃-hexane gave 13L (1.11 g, 91%) as colorless crystals: mp 93-94 °C; IR (KBr) 1591 cm⁻¹ (C=C), 1716 cm⁻¹ (C=O); MS (FAB, positive) m/z 362 (M⁺), 363 (MH⁺); ¹H-NMR (CDCl₃) δ 3.91 (s, 3H, OCH₃), 5.12 (s, 2H, CH₂), 6.83-6.90 (m, 3H, ArH), 7.30-7.36 (m, 1H, ArH), 7.48-7.53 (m, 4H, ArH), 7.60-7.66 (m, 1H, ArH), 8.06 (d, J = 8.4 Hz, 2H, ArH), 8.20 (d, J = 8.4 Hz, 2H, ArH); ¹³C-NMR (CDCl₃) δ 52.1 (CH₃), 69.5 (CH₂), 108.7 (CH), 112.5 (CH), 114.5 (CH), 127.0 (CH), 128.6 (CH), 129.5
Preparation and characterization of 13B. A solution containing 12 (0.82 g, 3.59 mmol), 3,5-di(benzoxyloxy)phenol (1.20 g, 3.59 mmol), potassium carbonate (0.75 g, 5.43 mmol), and 18-crown-6 (0.48 g, 1.82 mmol) in acetone (8 mL) was refluxed with vigorous stirring under argon. After 4 hours, the reaction mixture was cooled to room temperature, poured into saturated ammonium chloride solution (5 mL), and extracted twice with ethyl acetate (20 mL). The extracts were washed with water (20 mL) and brine (20 mL), dried over Na₂SO₄, and concentrated in vacuo. Purification of the residue by flush column chromatography on silica gel (eluent: chloroform) and recrystallization from CHCl₃-hexane gave 13B (1.59 g, 92%) as colorless crystals: mp 138-139 ºC; IR (KBr) 1599 cm⁻¹ (C=C), 1724 cm⁻¹ (C=O); MS (FAB, positive) m/z 482 (M⁺), 483 (MH⁺); ¹H-NMR (CDCl₃) δ 3.91 (s, 3H, OCH₃), 5.14 (s, 2H, CH₂), 6.82-6.84 (m, 3H, ArH), 7.48-7.53 (m, 6H, ArH), 7.61-7.66 (m, 2H, ArH), 8.07 (d, J = 8.1 Hz, 2H, ArH), 8.17-8.20 (m, 4H, ArH); ¹³C-NMR (CDCl₃) δ 52.0 (CH₃), 69.8 (CH₂), 106.5 (CH), 108.8 (CH), 127.0 (CH), 128.7 (CH), 129.3 (C), 129.9 (C), 130.0 (CH), 130.3 (CH), 133.8 (CH), 141.4 (C), 152.2 (C), 159.8 (C), 164.8 (C), 166.9 (C). Anal Calcd for C₂₂H₁₈O₅: C, 72.92; H, 5.01; N, 0.00. Found: C, 72.87; H, 4.89; N, 0.00.

Preparation and characterization of 14L. A solution containing 13L (0.81 g, 2.24 mmol) and n-butylamine (2.22 mL, 22.5 mmol) in THF (10 mL) was refluxed with stirring under argon. After 18 hours, the reaction mixture was cooled to room temperature, and concentrated in vacuo. Purification of the residue by silica-gel column chromatography (eluent: chloroform/hexane = 50/50) and recrystallization from CHCl₃-hexane gave 14L (0.49 g, 85%) as white powders: mp 92-93 ºC; IR (KBr) 1595 cm⁻¹ (C=C), 1695 cm⁻¹ (C=O), 3375 cm⁻¹ (OH); MS (FAB, positive) m/z 258 (M⁺), 259 (MH⁺); ¹H-NMR (acetone-d₆) δ 3.89 (s, 3H, OCH₃), 5.18 (s, 2H, CH₂), 6.44-6.53 (m, 3H, ArH), 7.07-7.13 (m, 1H, ArH), 7.61 (d, J = 8.7 Hz, 2H, ArH), 8.04 (d, J = 8.7 Hz, 2H, ArH), 8.38 (s, 1H, OH); ¹³C-NMR (acetone-d₆) δ 53.4 (CH₃), 70.7 (CH₂), 104.2 (CH), 107.9 (CH), 110.2 (CH), 129.2 (CH), 131.5 (CH), 133.8 (CH), 141.4 (C), 152.2 (C), 159.8 (C), 164.8 (C), 166.9 (C). Anal Calcd for C₂₉H₂₂O₇: C, 72.19; H, 4.60; N, 0.00. Found: C, 72.01; H, 4.51; N, 0.00.
Preparation and characterization of 14B. A solution containing 13B (0.85 g, 1.76 mmol) and n-butylamine (3.49 mL, 35.4 mmol) in THF (15 mL) was refluxed with stirring under argon. After 18 hours, the reaction mixture was cooled to room temperature, and concentrated in vacuo. Purification of the residue by silica-gel column chromatography (eluent: chloroform/hexane = 50/50) gave 14B (0.40 g, 83%) as white powders: mp 158-159 °C; IR (KBr) 1599 cm⁻¹ (C=C), 1684 cm⁻¹ (C=O), 3354 cm⁻¹ (OH); MS (FAB, positive) m/z 274 (M⁺), 275 (MH⁺); ¹H-NMR (acetone-d₆) δ 3.89 (s, 3H, OCH₃), 5.12 (s, 2H, CH₂), 6.01-6.04 (m, 3H, ArH), 7.58 (d, J = 8.7 Hz, 2H, ArH), 8.03 (d, J = 8.7 Hz, 2H, ArH), 8.25 (s, 2H, OH); ¹³C-NMR (acetone-d₆) δ 53.3 (CH₃), 70.6 (CH₂), 96.0 (CH), 97.9 (CH), 129.1 (CH), 131.5 (CH), 131.6 (C), 145.2 (C), 161.3 (C), 162.7 (C), 168.2 (C). Anal Calcd for C₁₅H₁₄O₅: C, 65.69; H, 5.15; N, 0.00. Found: C, 65.62; H, 5.07; N, 0.00.

Preparation and characterization of 15L. A solution containing 14L (0.17 g, 0.66 mmol), 9-(chloromethyl)-10-hexylanthracene (0.22 g, 0.71 mmol), potassium carbonate (0.12 g, 0.87 mmol), and 18-crown-6 (0.09 g, 0.34 mmol) in DMF (4 mL) was heated at 55 °C with stirring under argon. After 4 hours, the reaction mixture was cooled to room temperature, poured into saturated ammonium chloride solution (5 mL), and extracted with ethyl acetate (20 mL). The extracts were washed with water (20 mL) and brine (20 mL), dried over Na₂SO₄, and concentrated in vacuo. Purification of the residue by silica-gel column chromatography (eluent: chloroform/hexane = 80/20) gave 15L (0.31 g, 88%) as pale yellow powders: mp 149-150 °C; IR (KBr) 1591 cm⁻¹ (C=C), 1718 cm⁻¹ (C=O); MS (FAB, positive) m/z 532 (M⁺), 533 (MH⁺); ¹H-NMR (CDCl₃) δ 0.93 (t, J = 7.0 Hz, 3H, (CH₂)₃CH₃), 1.33-1.44 (m, 4H, (CH₂)₃(CH₂)₃CH₃), 1.57-1.63 (m, 2H, (CH₂)₂CH₂(CH₂)₂CH₃), 1.78-1.84 (m, 2H, CH₂CH₂(CH₂)₃CH₃), 3.62 (t, J = 8.1 Hz, 2H, CH₂(CH₂)₄CH₃), 3.91 (s, 3H, OCH₃), 5.09 (s, 2H, CH₂), 5.90 (s, 2H, CH₂), 6.64-6.68 (m, 1H, ArH), 6.76-6.83 (m, 2H, ArH), 7.29 (t, J = 8.2 Hz, 1H, ArH), 7.48-7.54 (m, 6H, ArH), 8.05 (d, J = 8.1 Hz, 2H, ArH), 8.26-8.34 (m, 4H, ArH), ¹³C-NMR (CDCl₃) δ 14.0 (CH₃), 22.6 (CH₂), 28.4
Preparation and characterization of 15B. A solution containing 14B (0.20 g, 0.73 mmol), 9-(chloromethyl)-10-hexylanthracene (0.49 g, 1.58 mmol), potassium carbonate (0.27 g, 1.95 mmol), and 18-crown-6 (0.19 g, 0.72 mmol) in DMF (4 mL) was heated at 55 °C with stirring under argon. After 4 hours, the reaction mixture was cooled to room temperature, and poured into saturated ammonium chloride solution to form a precipitation of the product. The precipitate was collected by filtration, intensively washed with water, and dried in vacuo to afford a pale yellow solid. Purification of the residue by silica-gel column chromatography (eluent: chloroform/hexane = 50/50) and recrystallization from CHCl₃-hexane solution gave 15B (0.52 g, 87%) as pale yellow powders: mp 149-150 ºC; IR (KBr) 1591 cm⁻¹ (C=C), 1718 cm⁻¹ (C=O); MS (FAB, positive) m/z 822 (M⁺), 823 (MH⁺); ¹H-NMR (CDCl₃) δ 0.92 (t, J = 7.1 Hz, 6H, (CH₂)₅C₃H₃), 1.33-1.43 (m, 8H, (CH₂)₃(C₂H₂)₂CH₃), 1.56-1.63 (m, 4H, (CH₂)₂CH₂(CH₂)₂CH₃), 1.79-1.84 (m, 4H, CH₂CH₂(CH₂)₂CH₃), 3.63 (t, J = 8.1 Hz, 4H, CH₂CH₂(CH₂)₃CH₃), 5.08 (s, 3H, OC₃H₃), 5.91 (s, 4H, CH₂), 6.50 (d, J = 2.1 Hz, 2H, ArH), 7.48-7.56 (m, 10H, ArH), 8.05 (d, J = 8.4 Hz, 2H, ArH), 8.29-8.35 (m, 8H, ArH); ¹³C-NMR (CDCl₃) δ 14.0 (CH₃), 22.6 (CH₂), 28.4 (CH₂), 30.0 (CH₂), 31.3 (CH₂), 31.7 (CH₂), 52.1 (CH₃), 63.0 (CH₂), 69.4 (CH₂), 94.7 (CH), 94.9 (CH), 124.7 (CH), 125.0 (C), 125.1 (CH), 125.3 (CH), 126.2 (CH), 127.1 (CH), 129.4 (C), 129.7 (C), 129.9 (CH), 131.0 (C), 138.3 (C), 142.1 (C), 160.6 (C), 161.4 (C), 167.0 (C). Anal Calcd for C₅₇H₅₈O₅: C, 83.18; H, 7.10; N, 0.00. Found: C, 82.97; H, 7.00; N, 0.00.

Preparation and characterization of 16L. To a solution of 15L (0.14 g, 0.26 mmol) in anhydrous THF (10 mL) was added lithium aluminum hydride (0.01 g, 0.26 mmol) slowly at 0 °C with stirring under argon. The reaction mixture was stirred for additional 12 hours, cooled to 0 °C, quenched carefully with 5% aqueous hydrochloric acid (3 mL), extracted twice with ethyl acetate (20 mL). The extracts were washed with water (20 mL), saturated sodium bicarbonate (20 mL), and brine (20 mL),...
dried over Na₂SO₄, and concentrated *in vacuo*. Purification of the residue recrystallization from CHCl₃-hexane solution gave **16L** (0.13 g, 98%) as pale yellow powders: mp 148-151 °C; IR (KBr) 1587 cm⁻¹ (C=O), 3527 cm⁻¹ (OH); MS (FAB, positive) *m/z* 504 (*M*⁺), 505 (*MH⁺*); ¹H-NMR (CDCl₃) δ 0.93 (t, *J* = 7.0 Hz, 3H, (CH₂)₅C₃H₃), 1.33-1.44 (m, 4H, (CH₂)₃(CH₂)₂CH₃), 1.55-1.68 (m, 2H, OH and (CH₂)₂CH₂(CH₂)₂CH₃), 1.76-1.88 (m, 2H, CH₂CH₂(CH₂)₂CH₃), 3.64 (t, *J* = 8.1 Hz, 2H, CH₂(CH₂)₄CH₃), 4.70 (d, *J* = 3.1 Hz, 2H, CH₂OH), 5.05 (s, 2H, CH₂), 5.93 (s, 2H, CH₂), 6.66-6.69 (m, 1H, ArH), 6.79-6.82 (m, 2H, ArH), 7.29-7.32 (m, 1H, ArH), 7.38 (d, *J* = 8.2 Hz , 2H, ArH), 7.44 (d, *J* = 8.2 Hz , 2H, ArH), 7.49-7.55 (m, 8H, ArH), 8.27-8.37 (m, 8H, ArH); ¹³C-NMR (CDCl₃) δ 14.0 (CH₃), 22.6 (CH₂), 28.4 (CH₂), 30.0 (CH₂), 31.4 (CH₂), 62.9 (CH₂), 65.1 (CH₂), 69.8 (CH₂), 102.2 (CH), 107.3 (CH), 107.7 (CH), 124.8 (CH), 125.1 (CH), 125.3 (CH), 126.1 (CH), 127.3 (CH), 127.9 (CH), 129.4 (C), 130.1 (CH), 131.0 (C), 136.5 (C), 138.2 (C), 140.7 (C), 160.2 (C), 160.7 (C). Anal Calcd for C₃₅H₃₆O₃: C, 83.30; H, 7.19; N, 0.00. Found: C, 83.11; H, 7.12; N, 0.00.

**Preparation and characterization of 16B.** To a solution of **15B** (0.82 g, 1.00 mmol) in anhydrous THF (5 mL) was added lithium aluminum hydride (0.04 g, 1.05 mmol) slowly at 0 °C with stirring under argon. The reaction mixture was stirred for additional 12 hours, cooled to 0 °C, quenched carefully with 5% aqueous hydrochloric acid (3 mL), extracted twice with ethyl acetate (20 mL). The extracts were washed with water (20 mL), saturated sodium bicarbonate (20 mL), and brine (20 mL), dried over Na₂SO₄, and concentrated *in vacuo*. Purification of the residue recrystallization from CHCl₃-hexane solution gave **16B** (0.72 g, 91%) as pale yellow powders: mp 180-181 °C; IR (KBr) 1579 cm⁻¹ (C=O), 3521 cm⁻¹ (OH); MS (FAB, positive) *m/z* 794 (*M*⁺), 795 (*MH⁺*); ¹H-NMR (CDCl₃) δ 0.92 (t, *J* = 6.9 Hz, 6H, (CH₂)₅C₃H₃), 1.29-1.45 (m, 8H, (CH₂)₃(CH₂)₂CH₃), 1.55-1.64 (m, 5H, OH and (CH₂)₂CH₂(CH₂)₂CH₃), 1.76-1.86 (m, 4H, CH₂CH₂(CH₂)₂CH₃), 3.62 (t, *J* = 8.1 Hz, 4H, CH₂(CH₂)₄CH₃), 4.67 (s, 2H, CH₂OH), 5.01 (s, 2H, CH₂), 5.89 (s, 4H, CH₂), 6.50 (d, *J* = 1.9 Hz, 2H, ArH), 6.63 (t, *J* = 1.9 Hz, 1H, ArH), 7.36 (d, *J* = 8.2 Hz, 2H, ArH), 7.42 (d, *J* = 8.2 Hz, 2H, ArH), 7.49-7.55 (m, 8H, ArH), 8.28-8.34 (m, 8H, ArH); ¹³C-NMR (CDCl₃) δ 14.0 (CH₃), 22.6 (CH₂), 28.4 (CH₂), 30.0 (CH₂), 31.3
Preparation and characterization of A1. To a solution containing 16L (0.69 g, 1.37 mmol), lithium chloride (1.74 g, 41.0 mmol), and triethylamine (0.86 mL, 6.20 mmol) in anhydrous THF (5 mL), a solution of methanesulfonyl chloride (0.32 mL, 4.13 mmol) in anhydrous THF (5 mL) was added slowly at 0 °C. After stirring for additional 12 hours at room temperature, the reaction mixture was quenched by slow addition of 5% aqueous hydrochloric acid (10 mL), and then extracted twice with chloroform (30 mL). The extracts were washed with water (20 mL) and brine (20 mL), dried over anhydrous Na2SO4, and concentrated in vacuo. Purification of the residue by recrystallization from chloroform-hexane solution gave A1 (0.69 g, 96%) as pale yellow powders: mp 139-141 ºC; IR (KBr) 1587 cm⁻¹ (C=C); MS (FAB, positive) m/z 522 (M⁺), 523 (MH⁺); ¹H-NMR (CDCl₃) δ 0.93 (t, J = 7.0 Hz, 3H, (CH₂)₅C₃H₃), 1.33-1.46 (m, 4H, (CH₂)₃(CH₂)₂CH₃), 1.55-1.63 (m, 2H, (CH₂)₂CH₂(CH₂)₂CH₃), 1.77-1.85 (m, 2H, CH₂CH₂(CH₂)₄CH₃), 3.63 (t, J = 8.1 Hz, 2H, C₂H₂(CH₂)₄CH₃), 4.58 (s, 2H, C₂H₂), 5.04 (s, 2H, C₂H₂), 5.91 (s, 2H, C₂H₂), 6.65-6.68 (m, 1H, ArH), 6.77-6.82 (m, 2H, ArH), 7.29 (t, J = 8.1 Hz, 1H, ArH), 7.38-7.44 (m, 4H, ArH), 7.49-7.54 (m, 4H, ArH), 8.27-8.35 (m, 4H, ArH); ¹³C-NMR (CDCl₃) δ 14.0 (CH₃), 22.6 (CH₂), 28.4 (CH₂), 30.0 (CH₂), 31.4 (CH₂), 31.7 (CH₂), 45.9 (CH₂), 62.9 (CH₂), 69.5 (CH₂), 102.2 (CH), 107.3 (CH), 107.6 (CH), 124.7 (CH), 125.1 (CH), 125.2 (CH), 126.0 (CH), 127.9 (CH), 128.9 (CH), 129.4 (C), 130.2 (CH), 131.0 (C), 137.25 (C), 137.34 (C), 138.2 (C), 160.1 (C), 160.7 (C). Anal Calcd for C₅₆H₅₈O₄: C, 84.60; H, 7.35; N, 0.00. Found: C, 84.46; H, 7.19; N, 0.00.

Preparation and characterization of A2. To a solution containing 16B (0.29 g, 0.36 mmol), lithium chloride (0.47 g, 11.1 mmol), and triethylamine (0.23 mL, 1.66 mmol) in anhydrous THF (5 mL), a solution of methanesulfonyl chloride (0.09 mL, 1.16 mmol) in anhydrous THF (5 mL) was added slowly at 0 °C. After stirring for additional 12 hours at room temperature, the reaction mixture was quenched by slow addition of 5% aqueous hydrochloric acid (5 mL), and then extracted twice with chloroform (20 mL). The extracts were washed with water (20 mL) and brine (20 mL), dried over anhydrous Na₂SO₄,
and concentrated in vacuo. Purification of the residue by recrystallization from chloroform-hexane solution gave A2 (0.28 g, 94%) as pale yellow powders: mp 159-160 °C; IR (KBr) 1597 cm⁻¹ (C=C); MS (FAB, positive) m/z 812 (M⁺), 813 (M'H⁺); ¹H-NMR (CDCl₃) δ 0.89 (t, J = 7.0 Hz, 6H, (CH₂)₅SH₃), 1.28-1.37 (m, 8H, (CH₂)₃(CH₂)₂CH₃), 1.48-1.57 (m, 4H, (CH₂)₃CH₂(CH₂)₂CH₃), 1.69-1.79 (m, 4H, CH₂CH₂(CH₂)₃CH₃), 3.50 (t, J = 8.1 Hz, 4H, CH₂(CH₂)₄CH₃), 4.45 (s, 2H, CH₂Cl), 4.87 (s, 2H, CH₂), 5.69 (s, 4H, CH₂), 6.43 (d, J = 1.9 Hz, 2H, ArH), 6.55 (t, J = 1.9 Hz, 1H, ArH), 7.25-7.32 (m, 4H, ArH), 7.41-7.45 (m, 8H, ArH), 8.18-8.25 (m, 8H, ArH); ¹³C-NMR (CDCl₃) δ 14.0 (CH₃), 22.6 (CH₂), 28.2 (CH₂), 29.9 (CH₂), 31.3 (CH₂), 31.6 (CH₂), 45.8 (CH₂), 62.8 (CH₂), 69.5 (CH₂), 94.5 (CH), 94.9 (CH), 124.7 (CH), 125.0 (CH), 125.10 (C), 125.13 (CH), 126.0 (CH), 127.8 (CH), 128.8 (CH), 129.3 (C), 130.9 (C), 137.1 (C), 137.1 (C), 138.0 (C), 160.8 (C), 161.3 (C). Anal Calcd for C₅₆H₅₇ClO₃: C, 82.68; H, 7.06; N, 0.00. Found: C, 82.40; H, 7.04; N, 0.00.
$^1$H-NMR spectrum of 12
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$^{13}$C-NMR spectrum of 12
\(^1\)H-NMR spectrum of 13L
$^{13}$C-NMR spectrum of 13L
$^1$H-NMR spectrum of 13B
$^{13}$C-NMR spectrum of 13B
$^1$H-NMR spectrum of 14L
$^{13}$C-NMR spectrum of 14L
\(^1\)H-NMR spectrum of 14B
$^{13}$C-NMR spectrum of 14B
$^1$H-NMR spectrum of 15L
$^{13}$C-NMR spectrum of 15L
$^1$H-NMR spectrum of 15B
$^{13}$C-NMR spectrum of 15B
$^{1}$H-NMR spectrum of $^{16}$L.
$^{13}$C-NMR spectrum of 16L
$^1$H-NMR spectrum of 16B
$^{13}$C-NMR spectrum of 16B
$^1$H-NMR spectrum of A1
$^{13}$C-NMR spectrum of A1
$^{13}$C-NMR spectrum of A2
$^1$H-NMR spectrum of 7
$^{13}$C-NMR spectrum of 7
$^{1}$H-NMR spectrum of 8
$^{13}$C-NMR spectrum of 8
$^1$H-NMR spectrum of 9
$^{13}$C-NMR spectrum of 9
$^1$H-NMR spectrum of 10
$^{13}$C-NMR spectrum of 10
SEC traces of 7-10